Draft Geotechnical NPDES General Permit (AKG-28-4300) – Follow-Up Questions for Shell

EPA would like to discuss the following questions in response to Shell's comment letter and associated attachments regarding the draft Geotechnical GP, submitted on February 18, 2014.

1. <u>Discharge Volumes</u> – EPA addressed the discharge volumes from geotechnical boring activities as compared to exploration well drilling in Section 2.2 and throughout the draft Ocean Discharge Criteria Evaluation (ODCE). This analysis was based on discharge volume information submitted by Shell in its April 3, 2013 NPDES permit application and the estimated number of boreholes information submitted by the Alaska Oil and Gas Association (AOGA). Shell's written comments on the draft Geotechnical GP did not address the discharge volumes and EPA's assumptions presented in Table 6-4 of the ODCE. Given that EPA's analysis and the underlying assumptions were based on information provided by Shell and AOGA, revisiting this analysis will require detailed and specific information. Please provide specific information addressing EPA's assumptions regarding discharge volumes along with all necessary supporting documentation. In addition, as pointed out by Shell in its comments, EPA's ODCE assumed all holes would utilize drilling fluids. (See #5, Use of drilling fluids, below.) Given Shell's comments that this is not consistent with intended operations, please provide an estimate of the number of holes and the depths of the holes for which drilling fluids are likely to be used.

2. <u>EMP Requirements</u> – As explained in the permit and Fact Sheet, the draft Geotechnical GP requires two phases of the EMP. Phase I includes a physical (wind/current speed and direction, water temperature, salinity, depth and turbidity) and visual characterization of the seafloor at each borehole location. A Phase II assessment includes non-contact cooling water discharge observations and physical sea bottom survey, which is only required if drilling fluids are used. Please explain how Shell views the geotechnical EMP requirements to be similar to the four phases of the EMP required under the exploration general permits (Attachment 1, comment II, page 5). Also, Shell pointed to various baseline and monitoring programs as the bases for removal of the EMP requirements. Please explain how data from these monitoring programs would meet the objective and information needs of an EMP, such as specific depositional data from each geotechnical discharge location.

3. <u>Once per batch</u> – EPA's use of the term "batch" and related permit assumptions and provisions were based on information previously provided by AOGA. For example, #4 of the AOGA response document indicated that one batch of drilling fluids could be used across multiple boreholes; any unused drilling fluids would be used at the next borehole and mixed drilling fluids that remain in the tanks at the end of the season would be discharged. Based on this information, EPA understood one batch could be used to drill multiple boreholes. According to Shell's comments on the Geotechnical GP, however, certain situations may require the opposite, i.e. multiple batches would be needed for every 20 feet of borehole drilled (Attachment 1, page 9). Also, as reported in Shell's NPDES permit application, the mud pit would be periodically cleaned and the excess materials discharged at an estimated volume of 2400 gal/day. Please clarify this issue by providing: 1) specific information on the estimated volumes discharged per batch; 2) the frequency at which new batches of drilling fluids will be mixed on a per borehole basis; and 3) the likelihood that a new mud formulation would be used during the course of a season.

4. Geotechnical related activities – Shell's comments did not provide specific information to inform the description of geotechnical related activities in the ODCE (Attachment 2, #17). Please provide the specific details addressing EPA's assumptions of the estimated level of activity, area of potential impact, discharge volumes, and the nature, frequency, type and locations of geotechnical related activities that could occur during the 5-year term of the permit.

5. Use of drilling fluids – Shell's comments state, "Shell does not anticipate using muds except in deeper borings, and we do not anticipate deeper borings to constitute a substantial part of our geotechnical programs. If drilling muds are used, the volumes are minimal and extremely short term in duration…" (Attachment 2, #21). As the Geotechnical GP is a general permit that may apply to multiple operators, it is not unusual for EPA to rely on conservative assumptions to evaluate potential impacts from discharges. In addition, Table 2 of the AOGA response document reported estimated volumes of cuttings and drilling fluids discharged per borehole, including the shallow borings drilled at 50 ft. The statement in Shell's comment letter does not provide a sufficient basis for assumptions regarding drilling fluid use and/or discharge volumes. If Shell has additional information or estimates on the number of boreholes for which drilling fluids are likely to be used, please provide it for EPA's consideration. Similarly, if drilling fluids will not be used to drill any shallow borehole, i.e. those that are drilled 50 feet or less below the seafloor surface, then Shell must explicitly say so.

6. Predictive modeling – Shell's comments asserted that the currents used for EPA's dispersion model are not representative of conditions in the nearshore environment (Attachment 2, #25). Please provide the specific information Shell has identified in EPA's model assumptions and provide the data that should be considered representative.

7. Pre-site characterization – Shell discussed its pre-siting activities to avoid any potential sensitive or archaeologically important areas (Attachment 2, #52). Please provide additional information regarding the specific regulatory authority or jurisdiction under which this pre-siting work is being performed, to whom the data is reported, and the locations and the distances of the pre-site surveys relative to the individual borehole locations.

8. Lack of substance in Shell's comments – Shell pointed to multiple places in the ODCE that lacked details and understanding by EPA, yet specific and substantive details supporting these statements were not provided. Please provide the specific information or details that should have been included in the ODCE. Below are several examples from Attachment 2:
    a) Comment #19 stated that several significant differences between exploration and geotechnical surveys are not identified, including type of discharge, cutting size and depositional pattern. Please provide this information.
    b) Comment #20 pointed to the lack of detailed description of conventional methods of coring and of "related activities." Please provide the information to assist with characterizing these activities.
    c) Comment #39 referenced numerous biomagnification studies of drilling fluid discharges conducted since the 1980s that demonstrates that bioavailability and bioaccumulation are negligible. Please provide references for these studies.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Sunday, April 20, 2014 7:35 PM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: RE: EPA's questions for March 26 meeting
Attachments: Shell Timing of Activities Question 4.pdf

Hanh,

Please find attached a document prepared by Shell as a partial response to Question #4, Geotechnical Related Activities, from the list of question provided to Shell by EPA back in March. The focus of the attached document is Timing of Geotechnical Surveys. Shell understands that EPA's Question #4 has a broader scope than just the timing of surveys, and we intend to address the remainder of Question #4 and the rest of EPA's other questions in forthcoming documents. Rather than waiting until all of the documents detailing Shell's responses are finished, we elected to commence the flow of Shell's responses.

I look forward to discussing with EPA any questions or comments on the attached, plus the additional forthcoming documents.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

____

Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

EPA Question #4: Geotechnical Related Activities

Timing of Geotechnical Surveys

Introduction

Shell Exploration & Production Company – Alaska Venture (Shell) provides the following discussion on currently estimated timing, and methodology for conducting geotechnical surveys in the Alaska Arctic from vessels in the offshore and nearshore, and from vehicles working from landfast ice in the vicinity of the beach or shoreline crossing (transition zone). Shell assumes the offshore geotechnical surveys will be conducted in federal waters of the Outer Continental Shelf (OCS) and thus be governed by EPA's general permit for oil and gas geotechnical surveys (GGP) activities, which is currently in draft form. Whereas, geotechnical surveys conducted within three nautical miles of the coast, which may include some of the nearshore surveys and for the most part those in the transition zone, are within waters of the State of Alaska and therefore under the general permit for geotechnical surveys released by the Alaska Department of Environmental Conservation (DEC), which is also currently in draft form. Shell includes discussions of timing geotechnical surveys in the offshore, nearshore, and transition zone in this response to EPA because the timing of all three locations assume that their timing is dependent on Shell's communication regarding, and planned avoidance of, impacts to subsistence activities. While what is provided herein is believed to be a good representation of these activities, and their timing, at the current time, they may in the future be subject to some alteration owing to information/experiences obtained in the field and/or Shell's future developmental plans.

Offshore Geotechnical Surveys

Shell plans for a 110 day open-water Alaska Arctic offshore geotechnical campaign starting July 1 in Dutch Harbor. Our planning premise assumes approximately 62 working days out of the 110 day total and this assumes geotechnical surveys could be conducted in both the Beaufort and Chukchi Seas. Offshore geotechnical surveys will generally be carried out in federal waters of the Outer Continental Shelf (OCS) from the deck of a dedicated geotechnical vessel in waters approximately >25 meters (m) depth using conventional wet rotary techniques with drilling fluids discharged at the seafloor. Here the term drilling fluid(s) refers to the medium used while drilling with conventional wet rotary techniques. Depending on the depth of soil borings and subsurface conditions encountered during drilling of soil borings, the drilling fluid(s) may contain only seawater and excavated soil while drilling shallow borings (~< 50 feet), or could contain a drill mud/seawater mixture, and additives with cuttings (soil, sand, gravel, and rock bits) when drilling conditions call for additions to the drilling fluid(s).

Shell's planning assumes for the geotechnical survey vessel to be in the Chukchi Sea around July 4th. Shell assumes that during the next season offshore geotechnical surveys that the initial task to be conducted will be a sound source verification (SSV) in the Chukchi Sea. The SSV is a condition of the incidental harassment authorization (IHA) issued by the National Marine Fisheries Service (NMFS) and an SSV must be conducted before an authorized activity gets underway. Shell assumes we will have applied for an IHA for this activity, and in the first season the geotechnical vessel and equipment to be used to conduct underwater, geotechnical surveys will be subject to the SSV requirement, since the vessel and equipment would not likely have been subjected to a prior SSV in either the Beaufort or Chukchi Sea. If the offshore geotechnical survey vessel is planning for surveys in both the Beaufort and Chukchi Seas, then following an SSV of 2 -3 days in the Chukchi Sea the vessel likel y would transit to the Beaufort Sea, if ice does not prohibit travel, and there will be an additional 2 or 3 days for an SSV in the Beaufort Sea. This planning assumes the ice normally trapped at Point Barrow has moved out. If the ice does not move out of the Beaufort Sea sufficiently to allow transit of the offshore geotechnical vessel , geotechnical survey activities w ould then commence after SSV in the Chukchi Sea until the vessel can safely transit past Point Barrow. The timing of the offshore geotechnical surveys in the Chukchi Sea precludes interference with the spring bowhead whale subsistence harvests out of Point Hope and Wainwright. Because of the limited number of available dedicated geotech nical survey vessels in the world , and the lack of those being ice classed, we believe other oil & gas (O&G) operators in the Arctic would formulate similar plans as Shell's for work in the Chukchi Sea.

If the geotechnical survey vessel transits past Point Barrow into the Beaufort Sea, geotechnical activities could commence in either Harrison Bay or Camden Bay after SSV , depending on Shell's planning. Shell's planning premise for t he Beaufort Sea assumes geotechnical surveys could continue until the vessel would likely depart the area in accordance with mitigation measures for bowhead whale subsistence harvests that Shell incorporates into our Plan of Cooperation (POC) with Beaufort Sea communities. Shell's planning premise is to not return to the Beaufort Sea for additional geotechnical surveys after departing. Depending on the volume of work to be conducted in the Beaufort, Shell's POC with the subsistence whaling communities may include measures to conduct work prior to freeze up. Shell's timing of geotechnical surveys via our POC will avoid conflict between Shel l's offshore geotechnical activities in the Beaufort Sea and fall bowhead whale subsistence h arvests. We expect similar plans to be formulated by other O&G operators in the Beaufort Sea.

Nearshore Geotechnical Surveys

Like the offshore geotechnical activities, nearshore geotechnical surveys for either the Chukchi or Beaufort Seas assumes the same 110 day season with a planning premise of at least 62 working days. Currently the nearshore work is planned to be performed from a self elevating, bottom founded barge (commonly termed lift barge) and will generally take place in state waters of Alaska, where DEC has primacy for discharges under their own geotechnical general permit. Depending on class of lift barge contracted , nearshore geotechnical surveys will be co nducted in waters <25m to a minimum water depth of about 5m. A lift barge offers a stable platform from which to perform the geotech nical surveys. The se surveys use conventional wet rotary techniques with drilling fluid d ischarges taking place at the seab ed, similar to the offshore portion of the project.

The timing of the nearshore work will correspond to that of the offshore portion of the work, during Shell's planning premise for a 110 day open -water season , after the spring bowhead whale subsistence h arvests of t he Chukchi Sea communities . In the Beaufort, portions of nearshore geotechnical surveys can be conducted from landfast ice within state waters in either Harrison or Camden Bay during the winter or early spring, a period outside of the bowhead whale subsistence harvests of the fall and within state waters under the primacy of the DEC geotechnical general permit. More seaward portions of nearshore geotechnical surveys in the Beaufort Sea can be conducted during the open water season and properly mitigated via Shell's POC with the subsistence whaling communities to avoid the potential for impact to bowhead whale subsistence harvests. Depending on the volume of work to be conducted in the Beaufort, Shell's POC with the subsistence whaling communiti es may include measures to conduct work prior to freeze up.

Beach or Shoreline Crossing (Transition Zone) Geotechnical Surveys

Shell's planning premise to perform transition zone geotechnical surveys begins in March when the landfast ice is at its thickest and anchored securely to the seabed, but depending on the year could begin as early as January. For all practical purposes, transition zone surveys are done within state waters and discharges from these surveys fall under the DEC geotechnical general permit. The timing of transition zone surveys is due to the fact that land drilling techniques and equipment, each mounted on a Rollingon, are brought out onto the landfast ice and used to perform the geotechnical activities through the ice. In 2006 Shell performed more than 40 soil borings across the transition zone to Flaxman and Mary Sachs Islands in Camden Bay using these methods. By using land geotechnical techniques from on ice, the boreholes are cased and drill returns taken at the surface. As in the above description of land drilling for the nearshore work, drill mud returns and cuttings are captured in a drilling pit at the surface and are recycled until they no longer shear or lift. At this point they are pumped off into a storage pit, vacuum truck, or barrels for later disposal at an onshore facility and a new batch of drill fluid and mud additives mixed. By using land techniques, there are no drilling fluids or cuttings intentionally discharged into the sea.

For future planning and taking into account the spring bowhead whale subsistence harvest in the Chukchi Sea, Shell may propose that transition zone geotechnical surveys begin from landfast ice as early as January. Shell would communicate this to the nearest communities and federal or state permitting agencies via Shell's POC. Potential for impacts to the spring bowhead whale subsistence harvest can be mitigated by conducting transition zone geotechnical surveys prior to the Chukchi Sea spring bowhead whale subsistence harvest. Due to the limited duration and limited distance landfast ice extends into the Chukchi Sea, operators may have a limited duration of time (perhaps as short as four weeks) to conduct on-ice geotechnical surveys in the transition zone of the Chukchi Sea out to about 10m of water depth, as this is normally as far out as the landfast ice extends in any given year. Since landfast ice is much more significant and extends much farther offshore in Camden and Harrison Bays, operators may plan to stay in the field performing geotechnical surveys for up to eight weeks or more in the Beaufort. Shell anticipates other operators, if performing similar work, would develop a similar schedule for on-ice geotechnical surveys.

Therefore, and as described in other submissions, Shell anticipates through development of a POC there could be no disruption to the spring bowhead whale subsistence harvest in the Chukchi Sea due to on-ice geotechnical activities in the shoreline transition zones. Hence, there is no justification for bowhead whale subsistence whaling closure periods through the EPA's draft geotechnical general permit for the Chukchi (and Beaufort) Seas. This is without regard to whether the surveys are limited to the transition zone, where DEC has primacy for discharges or even if transition zone surveys were extended into the federal waters of the OCS, where EPA's discharge authority governs. Further, the timing of offshore, nearshore, and transition zone geotechnical surveys proves the potential for impacts is effectively mitigated voluntarily by the planning and actions of the operators in their POC, rather than blanket closures to activities that essentially remove the incentive for practical cooperation.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Wednesday, April 23, 2014 12:19 PM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: RE: EPA's questions for March 26 meeting
Attachments: Shell Pretesting_precertification drilling mud Questions 1_3_5.pdf

Hanh,

Please find attached a document prepared by Shell in response to Questions #1 (Discharge Volumes), 3 (Once per batch), and 5 (Use of drilling fluids), from the list of question provided to Shell by EPA back in March. The focus of the attached document is Pre-Testing/Pre-Certification of Drilling Fluid/Mud Formulation. More documents will be forthcoming.

I look forward to discussing with EPA any questions or comments on the attached, plus the additional forthcoming documents.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

____

Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

<u>EPA Questions # 1, 3 and 5</u>

Pre-Testing/Pre-Certification of Drilling Fluid/Mud Formulation

Introduction

Shell Exploration & Production Company – Alaska Venture (Shell) has developed the following response to address content within Questions #1, 3 and 5 of EPA on the content of Shell's previous comments on drilling fluid content (use of additives), formulation frequency and analysis of drilling fluids metal content upon Section II B of the draft NPDES general permit for oil and gas geotechnical surveys (GGP) in the Alaska Arctic Beaufort and Chukchi Seas (AKG-28-4300). Shell submits the following information to address EPA's request to Shell for follow-up information with regard to the requirement listed on Page 25 of the draft GGP:

> "*The permittee must analyze each drilling fluids system for the metal contaminants of concern (see Table A). This analysis is required <u>once (1) per batch</u> of drilling fluids mixed at the facility. <u>If a new mixture of drilling fluids is created</u>, or a new drilling fluids system is used during the geotechnical activities program, then an additional metals analysis is required for the new batch" and the requirements listed in Table 1, page 27.*"

Shell intends that our response supports a distinction between our use of terms to describe bulk volumes of drilling fluid addi tives and drilling mud. Shell uses the term "lot" to define the total amount of drilling fluid additives (including viscosifiers and weighting agents) procured from a vendor for an entire geotechnical survey program and the term "batch" to represent an individual mix of drilling fluid comprised of a portion of that lot mixed with seawater and used during execution of geotechnical boreholes within an individual survey program. There is only one lot per an entire geotechnical survey, while there will be multiple batches of drilling fluid mixed each season. Shell proposes that applicants under the draft GGP be allowed to meet the analytical requirement under II B(3) on page 25 of the GGP per lot of drilling additives versus pe r batch which are mixed multiple times in season. Shell's support for this rationale is to conduct a "pre-testing/pre-certification" of the maximum concentration of components that could be used in a drilling fluid mixture via an analysis consistent with I I B(3) of the draft GGP and have this done prior to execution of the geotechnical survey program . What is provided herein is believed to be a good representation of the process outlined at the current time . However, there m ay in the future need to be some alteration to the process owing to information/experiences obtained in the field and/or Shell's future developmental plans.

Drilling fluid consists of predominantly seawater, but on occasion may contain water -base gelling and weighting agent if the drilling fluid needs to maintain a positive head through the drill casing to mitigate the influence of "flowing" cohesionless soils. Shell assumes that seawater will be the d rilling fluid for all boreholes , but will be prepared with additives necessary as borehole site conditions may dictate. Boreholes of less than 50ft depth below the seabed likely will be advanced with only seawater as drilling fluid. There are even examples of geotechnical boreholes being advanced to upwards of 150 ft in depth without the use of drill mud additives on the North Slope; however, again, Shell will be prepared to utilize gelling/weighting agents as may be needed.

Prior to submitting notices of intent (NOIs) to discharge drilling fluids during geotechnical surveys, Shell would develop a drilling fluid p lan (DFP) for the boreholes proposed in the geotechnical survey program. The applicant's DFP will define all of the additives (e.g., gelling agents ("Zeogel"); weighting agents (barite); guar gum; or polymer-based gel) that might be used for the surveys and it will describe the maximum concentrations of any additives used. Shell would then have the drilling fluid with the "maximum additive system" analyzed for Suspended Particulate Phase (SPP) toxicity and present the analytical results of such testing to EPA within the information supplied with the NOI for the geotechnical survey program. This approach affords EPA the ability to know in advance the SPP toxicity for the concentration of a drilling fluid that may be discharged during the program. Shell would assert that this should be sufficient for the entire geotechnical drilling program without additional testing of any drilling fluid components unless those components of the DFP should change, which as asserted below is not likely.

Shell expects that each borehole will be started with seawater (without additives) as the drilling fluid. Typically, the first sign of necessity to include drilling fluid additives in order to complete a borehole is encountered when unconsolidated sands and/or loose gravel is encountered in a borehole. Unconsolidated sands and gravel tend to "flow" into the borehole and cause the drill pipe to stick. Also there is the possibility for sand and/or gravel to enter the bottom-hole assembly and cause the sampling/coring tool to become stuck. This could cause this equipment to become damaged, or lost downhole. These situations need to be avoided.

The first step to alleviate the "flowing", unconsolidated sands/gravel is to mix a viscosifier (gelling agent) into the drilling fluid pit. The viscosifiers typically used are either naturally occurring Attapulgite Clay based products, Guargum, or a water soluble polymer based product. These viscosifiers tend to create a "wall pack" in the boring preventing the unconsolidated sand/gravel from flowing into the borehole. If this does not solve the problem then a densifier (weighting agent), normally barium sulfate, an inert product with specific gravity of 4.1, is added to the drilling fluid/mud mix in the pit. The densifier is mixed at quantities to cause the pressure head in the borehole to become greater than the pore pressures in the *in-situ* soils thereby stopping the flow of the unconsolidated sands/gravel into the borehole annulus. If Attapulgite Clay gelling or Barium Sulfate weighting products are not commercially available at the start of the geotechnical program, Shell may elect to use naturally occurring Guargum or a polymer-based gelling agent. It is important to note that no other chemical additives other than the four listed above would ever be considered for the drilling fluid/mud mixes utilized for geotechnical activities.

In addition, Shell would purchase and take on one lot of drilling fluid additives at the start of the season and store in bulk tanks (or bagged pallet products, depending on availability) onboard the vessel for use during the entire open-water season. Depending on the size of the mud pits on the operating vessel, multiple batches of mud may be mixed for a single borehole or if the tank capacity is larger, one batch of mud maybe used for sampling at multiple boreholes. Regardless of what quantities the mud is mixed in, one lot of barite will be used in a single season due to logistical and resupply constraints. Additionally, the quantities of additives used in the mud program will be consistent with the toxicity analysis run pre-mobilization and the formulations presented in the DFP. Thus, given that the materials that could actually be used as part of a fluids process (aside from seawater) would be pre-analyzed, it is not necessary to analyze them again prior to, during, or at the conclusion of mixing on the vessel.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Thursday, April 24, 2014 10:34 AM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: RE: EPA's questions for March 26 meeting
Attachments: Shell Vessel Discharge Volume Estimates_Question 1.pdf

Hanh,

Please find attached a document prepared by Shell in response to Question #1 (Discharge Volumes) from the list of questions provided to Shell by EPA back in March. The focus of our response centers on vessel discharge volumes and pre-existing regulatory requirements. More documents on the remaining questions will be forthcoming.

I look forward to discussing with EPA any questions or comments on the attached, plus the additional forthcoming documents.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

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Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

EPA Question #1: Discharge Volumes

Vessel Discharge Volume Estimates

Introduction

Shell Exploration & Production Company – Alaska Venture (Shell) has prepared this response to EPA's Question #1 on the content of Shell's prior comment on vessel discharge monitoring requirements in Section II. A(2) of the draft NPDES general permit for oil and gas geotechnical surveys (GGP) in the Alaska Arctic Beaufort and Chukchi Seas (AKG-28-4300). What is provided herein is believed to be a good representation of these situations at the current time, but they may in the future be subject to some alteration owing to information/experiences obtained in the field and/or Shell's future developmental plans.

Shell's response to EPA's question on vessel discharges and volume assumptions for a range of geotechnical vessels that could be used centers on the initial toxicity screening, fecal coliform sampling, and other additional sampling requirements specified under each specific "vessel discharge" stream in the draft GGP which are above and beyond that which EPA requires for vessels operating as a mode of transportation under EPA's Vessel General Permit (VGP). A geotechnical survey vessel operating in the offshore is positioned over the site of a geotechnical survey via dynamic positioning (DP) for a short duration of time during which a borehole is sampled. During the time the vessel is "on DP" it continues to operate as a marine mode of transportation. Due to the short duration of time necessary for the sampling of a borehole from the vessel there is a correspondingly low likelihood of any ecologically-significant potential impact from the vessel-specific discharges. The types of vessels used for offshore geotechnical surveys frequently operate "on DP" in the offshore regardless of the activity or purpose being performed and are not restricted from discharging the specific vessel discharge streams defined in the draft GGP, or the restrictions are regulated by other means such as MARPOL (International Convention for the Prevention of Pollution from Ships), the US Coast Guard, or EPA's VGP. Even for vessels that do not operate on DP, such as a liftboat, (described in a forthcoming document) the duration of time the vessel is on-site to sample remains as limited as a geotechnical vessel "on DP" sampling a comparable depth borehole offshore. Consequently, Shell believes the monitoring requirements for the vessel discharge streams in the draft GGP from vessels conducting a geotechnical survey whether "on DP" or from a liftboat should be comparable to the VGP.

In Shell's initial application that was submitted to EPA January 30, 2013, it is acknowledged that some volume estimates were provided for "vessel" discharges and discharges associated with geotechnical surveys based on maximum pump capacity not on measured volume discharges. However, as described below, estimating the volumes associated with the "vessel" discharges is very difficult as vessels aren't currently required, nor configured to monitor this type of information (with the exception of bilge treated through an oil water separator). There are no reasonably feasible methods currently in place to accurately measure the volumes associated with "vessel" discharges. It would be extremely expensive to install monitoring equipment on a range of vessels that could be used to perform these activities – with no corresponding benefit to the assessment of environmental impact of these ephemeral discharges. Monitoring of volumes associated with vessel discharges is not required by EPA's VGP and Shell contends should similarly not be a part of any GGP for geotechnical survey vessels while performing short-duration site activities. It is our recommendation based on the information summarized below and the work that EPA has recently completed to authorize these same discharge streams from a much broader range of vessels (all vessels greater than 79 feet operating in US Waters) in the VGP, that EPA does not have the requisite ju stification to regulate geotechnical surveys vessel discharges in the GGP more frequently than, or in fact any differently, than, is already required by a VGP.

Non-Contact Cooling Water

Non-contact cooling water discharge varies greatly from vessel to vessel depending on the size of the propulsion and power generation plant and where the vessel is designed to primarily operate. The cooling systems for a ship are designed by shore side design engineers and naval architects to be properly sized to adequately cool shipboard equipment.

Possible ranges of volumetric flow - Non-contact cooling water flow varies from zero discharge in a closed loop system that utilizes keel coolers (normally only found on smaller vessels) to the sea water flow required to provide enough cooling for a specific plant.

Non-contact cooling water is not typically monitored for the following reasons:

A). There is no ecologically-significant impact from non-contact cooling water as the non-contact cooling water is only a few degrees warmer than ambient seawater temperature. In addition, by definition, non-contact cooling water does not contact contaminants. The only effect on the cooling water is an increase in temperature as it is heated via contact with the plant, thus there is no need for toxicity testing; and

B). There is no practical way to control the non-contact cooling water flow. The pumps and piping is specifically designed and built to provide adequate cooling for a shipboard plant, without flow meters.

Black Water

Treated black water discharge depends on the size of the vessel and personnel on board (POB). A properly designed and certified marine sanitation device (MSD) is allowed to adequately treat waste for a specified number of POB.

Possible ranges of volumetric flow – Black water flow varies from zero (if the vessel has adequate storage for temporary holding) to the design discharge of the installed treatment system.

The most significant potential environmental effect of treated sewage discharges is residual chlorine used in the treatment process.

Gray Water

The amount of gray water discharge depends on the size of the vessel and the vessel's POB. Some vessels have the capability of processing gray water through the MSD and some vessels only have gray water piping that leads directly overboard.

Possible ranges of volumetric flow – Gray water flow varies from zero (if the vessel has adequate storage for temporary holding) to the total amount of gray water produced by vessel crew. This is highly dependent on the vessel POB and a number of factors (amount of laundry, cooking, showers, etc).

The potential environmental effect of gray water is dependent on what is discharged down the drains, usually water with residual soap.

Deck Drains

The amount of deck drain discharge depends on the size of the vessel and the vessel's activities. Some vessels have the capability of processing drain water through the oil water separator and other vessels only have deck drains leading directly overboard.

Possible ranges of volumetric flow – Deck drain flow varies from zero (if the vessel has adequate storage for temporary holding) to the amount of seawater, rain water, etc drained from the vessel's exterior decks.

The environmental effect of deck drains should be negligible as long as controls are in place to ensure they aren't used to dispose of inappropriate materials, as is already required in the vessel best management practices.

De-salination Discharge

The amount of de-salination discharge depends on the size of the vessel and POB. The larger the POB, the higher fresh water consumption rating, and a corresponding higher demand for fresh water.

Possible ranges of volumetric flow – De-salination flow varies from zero (on vessels with no water making capabilities) to the corresponding de-salination discharge from water makers. This amount will depend on the capacity of the water maker.

De-salination discharge is not typically monitored for the following reasons:

A). There is little to no environmental harm from de-salination discharge. De-salination discharge is simply seawater with a moderately greater salt concentration than seawater.

B). There is no practical way to control the de-salination discharge if a water maker is in use. Water makers are purposely designed to extract salt from the water to produce fresh and potable water.

Bilge Discharge

The amount of bilge water discharge depends on the size of the vessel and activities performed. Most vessels (except for smaller boats) have oily water separators that are designed to remove oil content from bilge water to 15 parts per million (PPM) or lower.

Possible ranges of volumetric flow – Bilge water varies from zero (if the vessel has adequate storage for temporary holding) to the amount of bilge water produced by the vessel operations.

With the exception of smaller craft, bilge processed through an oil water separator is monitored and recorded in an official oil record book.

The environmental effect of bilge discharge is generally negligible if oil water separators in the larger vessels (i.e. with correspondingly higher discharges) are used properly. Controls in the VGP already address this concern.

Ballast Water

The amount of ballast water discharge depends on the size of the vessel and activities performed.

Possible ranges of volumetric flow – Ballast water flow varies from zero (on vessels with no ballast system or if the ballast system isn't being utilized) to the discharge required to maintain proper vessel stability and trim.

The environmental effects of ballast water discharge are generally negligible since it usually consists of sea water. There is potential to introduce invasive micro organisms via ballast water from different climates. This can be mitigated via ballast water exchange at sea as required by a proper Ballast Management Plan. Also some vessels use freshwater as ballast instead of sea water.

Fire Water

Fire water discharge depends on the size of the vessel and the vessel's activities.

Possible ranges of volumetric flow – Fire water varies from zero to the amount of discharge required by the vessel's activities.

There is no environmental effect from fire water because the system simply pumps sea water local to the vessel and discharges it back to the sea via piping and hoses, and no chemicals are added to these systems.

Boiler Blow Down

Boiler blow down discharge depends on the size of the vessel and the boilers installed (if the vessel even uses a boiler - some vessels will not even have a boiler on board.).

Possible ranges of volumetric flow – Boiler blow down varies from zero (if the vessel doesn't have boilers or doesn't need to blow down the boilers) to the amount of blow down required for boiler maintenance [usually not a large amount (less than 100 gallons) and usually not often (less than once a month)].

The potential environmental effects from boiler blow down depends on the feed water treatment chemicals being used. In this instance, we recommend EPA regulate this consistent with the VGP, requiring the permittee to reduce the use of chemicals.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Tuesday, April 29, 2014 2:39 PM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: RE: EPA's questions for March 26 meeting
Attachments: Shell Pre site Characterization_Question 7.pdf

Hanh,

Please find attached a document prepared by Shell in response to Question #7 (Pre-site characterization) from the list of questions provided to Shell by EPA back in March. The focus of our response centers on why existing measures undertaken and regulatory necessity for pre-site characterization should supplant the necessity from Section II.A. 14 (d) (1) of AKG-28-4300 for the described Phase I Assessment of the proposed environmental monitoring plan (EMP). More documents on the remaining questions will be forthcoming.

I look forward to discussing with EPA any questions or comments on the attached, plus the additional forthcoming documents.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

EPA Question #7: Pre-Site Characterization

Clarification of Pre-site Characterization Conducted Prior to Sampling

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Tuesday, April 29, 2014 6:45 PM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: RE: EPA's questions for March 26 meeting
Attachments: Shell Geotechnical Technology_ and Drilling Fluid Additions_Questions 4 and 5.pdf

Hanh,

Please find attached a document prepared by Shell in response to Questions #4 and #5 (Geotechnical related activities and Use of Drilling Fluids) from the list of questions provided to Shell by EPA back in March. This attached response is intended to augment our previous responses on geotechnical related activities sent April 20th and drilling fluid formulation sent April 23rd. Shell is nearing completion of documents intended to address EPA's questions. In addition, we will have some information coming forth shortly on topics discussed during the March 26th meeting.

I look forward to discussing with EPA any questions or comments on the attached, plus the additional forthcoming documents.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

____
Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

EPA Questions # 4 and #5

Description of Geotechnical Survey Sampling Technologies & Discussion of Types and Relative Frequency of Drilling Fluid Additions. [1]

Introduction

There are many various industry technologies available to accomplish field data acquisition for geotechnical surveys at a given site. The data required are described under the Code of Federal Regulations (CFRs) 30 CFR §§250.906 and 250.907 for design and installation of offshore facilities for oil and gas production in the United States, including the arctic North Slope of Alaska. Not all available technologies are feasible for use given the remoteness of the Arctic. Shell Exploration and Production Company – Alaska Venture (Shell) researched numerous technologies and based on operational considerations presents the most appropriate in the following paragraphs for use offshore, nearshore, and onshore. The categories are presented as offshore technologies, nearshore technologies, and, shore-crossing and land-based (onshore) technologies. The delineating water depth between offshore and nearshore is taken as approximately 25 meters (m). It is assumed that offshore and nearshore geotechnical surveys using its associated technologies may occur during open-water seasons in any given year. Shore-crossing surveys and its technologies are assumed to be operated from landfast ice during January-March of any given year, while onshore surveys and technologies are assumed to be operated from a Rolligon on snow pack during the winter months when ice roads can be constructed.

Offshore Geotechnical Technologies

The following paragraphs describe the most favorable field data acquisition technologies Shell has identified for accomplishing offshore geotechnical surveys (>25m water depth) in the Chukchi and Beaufort Seas off Alaska. Information on seabed-based geotechnical technologies that may be used in the future is also provided

Conventional Wet-Rotary Techniques. Wet-rotary sampling techniques are the methods most favored by Shell to accomplish geotechnical surveys offshore. These proven and successful methods have been employed in offshore environments since the 1940s. Conventional techniques are generally performed from a variety of vessel types with industry standard drill pipe and a top-drive drilling rig, specialty drill bits with a single center open port, specialty sampling/coring/*in situ* gear and a seabed frame/guide base used as a reaction mass. These activities are generally performed from the deck of a vessel positioned on location by either Dynamic Positioning (DP) utilizing satellite technology, or with older vessels a 4-point anchor spread.

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[1] What is provided herein is believed to be a good representati on of the subject matter at the current time, but processes, procedures and technologies may in the future be subject to some alteration owing to information/experiences obtained in the field and/or Shell's future developmental plans.

To accomplish these activities, the general procedures are:

- The vessel is positioned over a borehole location and the DP system is engaged. The DP system is allowed to settle in for about 30 minutes to one hour while the deck crew rigs up the geotechnical survey apparatus and sampling equipment.
- Once the DP positioning is approved, the conventional API drill pipes and Bottom Hole Assembly (BHA-latching system and drill bit) are lowered from the deck of the vessel to just above the seafloor using the drill rig top drive.
- A scanning sonar unit is then deployed through the drill pipe and latches in the BHA. This sonar unit is used to develop an electronic rendering of the seabed immediately below the drill string in order to assess if there are obstructions to lowering the SeaBed Frame (SBF) to the seafloor.
- If a 4-point moored vessel is used for the geotech activities, then each planned anchor location is assessed with the scanning sonar as described above.
- Once the site is cleared, the SBF is lowered to the seafloor over the drill pipe with a two-part heavy lift winch. A centralizer apparatus is used above the SBF to keep the winch cables from fouling on the drill pipe.
- With the SBF firmly supported on the seabed, sampling activities may commence. The drill pipe is lowered through the clamps located on the SBF and positioned just above the mudline. A sampling tool with a core tube attached (there are many various sampling/coring tools used depending on the soil type expected to be encountered) is lowered through the drill pipe with a wireline unit and latches firmly in the BHA. Once latched in the BHA the sampling tube extends approximately 1 m beyond the drill bit. Once latched, the drill pipe is then lowered with the top drive unit and the sampling tube is mechanically "pushed" into soil by the weight of the drill pipe. The drill pipe is then pulled out of the soil to just above the sampling depth with the drill pipe and top drive.
- The sampling tool and tube is then retrieved to the deck of the vessel using an overshot and the wireline unit. Once the sample is recovered to the deck, the borehole is advanced to the next sampling depth using wet rotary techniques. This process is repeated until the borehole is advanced to the planned final depth. Shell will not advance geotechnical surveys boreholes deeper than 499 feet (ft) in compliance with Bureau of Ocean Energy Management (BOEM) regulations.

There are many combinations of sampling tools and core barrels that can be used to accomplish the borehole objectives. Each tool is designed for specific soil types and each tool is operated in different ways. All tools are deployed and retrieved via a wireline through the drill pipe as described above. Sometimes, If the planned geotechnical survey program calls for it, an *in situ* testing tool called a Piezo Cone Penetration Testing (PCPT) sounding device can be lowered to the BHA on an electric cable and activated to electronically measure pore pressure, cone tip resistance, side friction, and optionally seismic response of the *in situ* soils up to 3 meters ahead of the drill bit. Since the soil response is measured with electronic sensors, no sample is recovered to the deck at the end of the sounding.

Use of Drilling Fluids. Wet-rotary techniques advance a soil boring as an "open-hole" using only the BHA and drill string to drill out the formation between sampling and *in situ* testing intervals. This involves the use of drilling fluids to (1) lubricate the drill string, preventing stuck pipe, and (2) "lift" or flush the formation cuttings out of the borehole. The mud pumps are adjusted to provide approximately 60 to 120 fps of drilling fluid traveling up the annulus of the borehole from the drill bit to the mudline (recommended range to flush most cuttings from a typical borehole). The drilling fluid and formation cuttings are expelled from the borehole annulus at the mudline and not recovered to the deck utilizing open-hole techniques. For any typical borehole we attempt to use only seawater as the drilling fluid to as deep as possible before the encountered stratigraphy necessitates the use of additives and we start mixing actual mud additives in the drilling fluid.

Typically the first sign of the need to add mud additives to complete a borehole is when unconsolidated sands are encountered in the borehole. These sands tend to "flow" into the borehole and may cause the pipe to stick. Also, sand may enter the BHA and cause the sampling/coring tool to become stuck. Both are situations that could lead to damaged equipment or worse, lost drill pipe or sampling equipment downhole. The first step to alleviate these flowing sands is to mix a viscosifier (gelling agent) into the drill fluid pit. The viscosifiers we typically use are either naturally occurring Attapulgite Clay based products, Guar gum, or a water soluble polymer based product. These viscosifiers tend to create a "wall pack" in the boring preventing the unconsolidated sand from flowing into the borehole. If this does not solve the problem then a densifier (weighting agent), normally barium sulfate, an inert product with an specific gravity of 4.1, is added to the drill mud mix in the pit. The densifier is mixed at quantities to cause the pressure head in the borehole to become greater than the pore pressures in the *in situ* soils thereby stopping the flow of the unconsolidated sands into the borehole annulus. It is important to note that we use no other chemical additives in the drilling mud mixes utilized for geotechnical activities. In addition, Shell would purchase and take on one lot of drilling additives at the start of the season and store in bulk tanks (or occasionally bagged pallet products, depending on availability) onboard the vessel for use the entire open-water season. Due to logistics, we never plan for drilling fluid additives resupply during actual field activities.

There are examples of geotechnical boreholes being drilled on the North Slope of Alaska to 150 feet (ft) without the use of drill mud additives. Shell expects to start each borehole with seawater as the drilling fluid, but may encounter situations in any boring where the additives identified above are necessary. When the encountered stratigraphy at any given boring site dictates the practical necessity of drilling fluid additives, we prepare for and use the drill mud gelling and weighting agents described above as needed to prevent lost or damaged equipment, or stuck drill pipe. Shell believes most boreholes to 50-ft can be conducted using only seawater unless an unconsolidated sand stratum is encountered shallow. For the deeper boreholes down to 499-ft depth we anticipate using drilling additives starting somewhere between 50- and 150-ft depth. Below 150-ft drilling additives will be necessary regardless if unconsolidated sands are encountered or not due to the need for drill string lubrication requirements at these depths.

Newer Seabed-Based Geotechnical Techniques. Since the early 2000s newer technologies have been developed in the marketplace that can be used to accomplish geotechnical activities offshore in the Alaskan Beaufort and Chukchi Seas. Most of these technologies have incorporated existing conventional slim-hole sampling techniques, *in situ* CPT testing methods, hardrock coring technologies, and remotely operated vehicle (ROV) telemetry to remotely operate the drill from the seabed. The methods utilized for advancing the borehole, sampling, and *in situ* testing are similar to those described under conventional technology; however there are some distinct advantages to the newer technology. The three main distinguishing features of the newer seabed-based technology and methodologies are; (1) the sampling unit is lowered to the seabed on an umbilical and operated remotely using ROV technology and telemetry.; 2) the overall borehole diameter is limited to a little over 4-inches utilizing slim-hole sampling and hard rock coring techniques; and, (3) the borehole is cased the entire depth so normally no drill mud additives are required to advance the borehole. However, in extreme geologic conditions a viscosifier (gelling agent) may be needed to ease friction on the drill string.

These three features lead to several advantages for this technology. First, from a health and safety standpoint the newer technology significantly lowers risk and exposure for personnel as compared to conventional sampling that typically take place on the deck of the vessel by being remotely operated by ROV technology through the deployment umbilical. Secondly, the sediment cuttings generated by the newer technology are less than those generated by conventional techniques. For a typical 50-ft deep sampling borehole, only about 12 gallons of cuttings are generated as compared to about three or more barrels of cuttings for a conventionally advanced borehole using wet-rotary techniques (about 90% less). And finally, no drilling fluid additives are required other than the very seldom used viscosifier to aid in advancing the borehole in extreme geologic conditions.

There are drawbacks to the use of the newer seabed-based technology that preclude its use at this time for all but potentially the shallowest planned boreholes in the Arctic. The primary disadvantage is the fact that to date, most of the newer technology sampling units have not been proved out in similar geologic conditions as we may encounter in the Chukchi Sea. The second most important disadvantage is the fact that none of the newer sampling units currently available on the open market are able to store enough casing onboard to complete the deeper boreholes to total depth that we require for engineering design. Most of the newer sampling units are able to accommodate about 30 to 40 meters of casing in their twin carousels along with all the other sampling tools and drill pipes. Even Fugro's SeaFloor Drill (SFD), which can be loaded with over 60 meters of casing, cannot complete our planned 100 m+ boreholes without advancing and sampling beyond the total casing depth. Shell continues to track and evaluate this new technology and welcomes advances in the technology that may allow its use for our Arctic prospects.

Nearshore Geotechnical Technologies

There are a few proven technological options available to complete nearshore geotechnical surveys. Both conventional open-hole wet-rotary (as discussed in previous paragraphs) and cased-hole technologies may be employed to complete the shallow water boreholes. And cased-hole operations can be completed by conventional land-based methods using either standard N-Rod and Hollow Stem Auger sampling techniques. The nearshore geotechnical activities will be performed during the open-water season, concurrent with the offshore activities, or possibly in alternating years.

The biggest difference between offshore (>25 meters water depth) and nearshore (>5 meters to about <25 meters water depth) geotechnical surveys is the vessel requirements. Whereas a typical vessel which rises and falls with the seas is used to complete boreholes in water depths greater than 25 meters, a stable platform is required in shallower waters. A bottom-founded barge, more commonly called a liftboat, is typically utilized to perform geotechnical surveys in shallow water. This is due to the limited depth of water below the vessel's hull through which the unsupported drill string passes. The greater length of drill string between the vessel's hull and seabed in deeper waters is more flexible and forgiving in rough seas and high winds that tend to move the vessel around while stationed on location with DP. Also, nearly all of the dedicated DP-class geotechnical vessels available are rather large at 75 meters to over 100 meters in length. These large vessels draw significant draught at about 5 to 7 meters. Most if not all of these vessels experience great difficulty attempting to hold position on DP in these shallow waters. The use of a liftboat to perform the shallow water geotechnical surveys eliminates the limitations of larger DP vessels working in shallow water depths with possible rough sea conditions.

There are competent contractors located in Alaska that can perform the nearshore geotechnical surveys from a liftboat utilizing land-based, cased-hole technology with either N-Rod or Hollow Stem Auger techniques. Numerous advantages can be realized by performing the nearshore work with either of these methods over conventional offshore open-hole wet-rotary techniques. If site conditions allow for cased-hole techniques, the holes can be advanced through casing that is driven into a competent stratum in the substrate that can provide a competent seal at the shoe of the casing. When performing geotechnical surveys through a string of casing in the water column, the drilling fluid, which may or may not be only seawater if conditions dictate, and cuttings returns are taken at the liftboat deck and recirculated to further advance the borehole until the mud will no longer shear and lift the cuttings out of the borehole. At this point, the drilling fluid may be refreshed with additional gelling additive and weight material. The formation cuttings are screened off and stored in barrels or a dedicated liquid storage tank for later disposal on land in an approved facility. In this way, very little drill mud is consumed over the course of the entire project as compared to that used offshore. In addition, as indicated by the above statement, no drill mud or cuttings are discharged into the environment at the seabed as in offshore wet-rotary techniques. Occasionally a leak will develop at the shoe of the casing string and allow a little drilling fluid to seep into the environment at the mudline. Normally the casing string is merely driven (or drilled) a little deeper into the substrate to reseat the casing shoe. If site conditions allow the use of cased-hole techniques then there is the possibility for further reduction of trace drilling mud or formation cuttings being discharged, and even a lesser chance of perceived impact to subsistence activities in the nearshore.

Shore-Crossing (Transition Zone) and Onshore Geotechnical Technologies and Timing

Like the nearshore geotechnical surveys discussed above, the shore crossing, or transition zone to onshore geotechnical surveys both use land-based, cased-hole technology utilizing either N-Rod or Hollow Stem Auger techniques. Instead of a vessel, the rig, core sampling and *in situ* PCPT sounding tools are mounted on Rolligons along with all the other support equipment including living quarters, galley, spare parts and shop, cooled and frozen sample storage, bulk drilling mud additives storage, and mud and cuttings disposal tanks. In the past Shell preferred to do shore-crossing, transition zone and onshore geotechnical surveys starting in March of any given year when the snow pack and landfast ice were the thickest. As Shell already presented in the "Timing of Activities" response to EPA's Question #4, Shell has successfully completed shore-crossing (transition zone) geotechnical surveys from landfast ice in Camden Bay in 2006 but is willing to plan to perform this work starting in January in future years. Assuming landfast ice thicknesses are sufficient, through performing surveys in January we will be out of the area prior to the start of the spring bowhead whale subsistence harvests. As with nearshore geotechnical surveys, if site conditions allow the use of cased-hole techniques, then there is the possibility of further reduction of discharge of trace drilling mud or formation cuttings.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Tuesday, May 06, 2014 3:45 PM
To: Shaw, Hanh
Cc: Heather.Ptak@shell.com; Seyfried, Erin
Subject: Draft NPDES Geotechnical General Permit (AKG-28-430 0) - Effluent Testing
Attachments: Shell Effluent Testing Responses.pdf

Hanh,

Please find attached a response from Shell on a requirement for effluent testing in the draft geotechnical general permit (GGP).

I look forward to discussing with EPA any questions or comments on the attached.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

Draft Permit for Authorization to Discharge under the National Pollutant Discharge Elimination System (NPDES) for Oil and Gas Geotechnical Surveys and Related Activities in Federal Waters of the Beaufort and Chukchi Seas – Permit No. AKG-28-4300 (draft GGP)

Request for Clarification – Shell/EPA March 26th Meeting

Draft Permit AKG-28-4300; Section II. A. Requirements for All Discharges (13); page 17:

> *"Effluent Toxicity Characterization. The permittee must conduct toxicity test on the following discharges when* ***"Chemicals"*** *are added to the systems: 002 (deck drainage), 005 (desalination unit waste), 006 (bilge water), 007 (boiler blowdown); 008 (fire control system test water), and 009 (non-contact cooling water)."*

Shell Exploration and Production Company – Alaska Venture (Shell) would ask the EPA to please clarify and define what EPA considers a *"chemical added to the system"* (ex. Section II. C., Table 2 – footnote[2]), which would trigger this toxicity testing requirement. In particular, please clarify whether rust, residual dirt, soap or ice melt on the desk would be considered a chemical. Would a biological growth inhibitor added to non-contact cooling water, boiler blow down water, or fire control system water be considered a chemical that would trigger an effluent toxicity characterization test?

Request to Modify Fecal Coliform Testing Requirements – Shell/EPA March 26th Meeting

Draft Permit AKG-28-4300 Section II. D. Requirements for Sanitary and Domestic Wastewater (Discharges 003 and 004); Table 3, page 31:

> *"Fecal Coliform Bacteria; Sample Frequency: Weekly; Sample Type: Grab"*

Fecal Coliform Testing – requires weekly sampling or sampling every time a vessel moves to a different block. The holding time for these samples is eight hours (including extraction by the laboratory). This sampling requirement and short holding time for analysis would require that offshore and nearshore geotechnical vessels be equipped with a helicopter deck to move the sample from offshore/nearshore to an onshore shorebase, where commercial logistics are not currently present to move that sample to a commercial laboratory in either Prudhoe Bay or Anchorage, AK within the holding time.

Since the geotechnical survey vessel is operating as a vessel even while performing surveys and is at a location for a short duration, Shell recommends EPA regulate treated sanitary waste consistent to the requirements of vessels acting as a mode of transportation under the Vessel General Permit (VGP). The discharge should be regulated in a manner that is consistent with the VGP and /or MARPOL since management of sanitary and domestic waste by the vessel is the same regardless of whether or not the vessel is at any one time a "facility" conducting geotechnical surveys. The VGP and MARPOL have limitations for discharge and apply standards for discharging from a certified marine sanitation device (MSD). The treatment standards and other requirements may be found within Parts 5.1.1 and 5.1.2, or 5.2.1 and 5.2.2 of the VGP, and within Annex IV of MARPOL Chapter 3 - Regulation 9.

For example:

> *"A permittee must route all sanitary wastes through a sanitary waste system that meets the applicable U.S. Coast Guard (USCG) pollution control standards then in effect [33 CFR 159: "Marine sanitation devices"]. For facility using marine sanitation device (MSD), the permittee must conduct annual testing of the MSD to ensure that the unit is operating properly. The permittee must report results annually.*

Alternatively, if EPA decides a "fecal coliform" testing requirement must persist in the final GGP, Shell then recommends that the maximum requirement feasible for a permittee should mirror what the Alaska Department of Environmental Conservation (DEC) has in its draft Alaska Pollutant Discharge Elimination System (ADPES) geotechnical general permit (DEC; Permit No. AKG-28-3100). The APDES draft geotechnical general permit includes monthly total residual chlorine (TRC) measurements as a surrogate parameter for fecal coliform and Enterococci bacteria, as well as minimum and maximum TRC concentrations. (APDES; Authorization to Discharge for Geotechnical Facilities in State Waters in the Arctic Ocean, General Permit AKG283100, Section 2.4, Table 4, Discharge 003, page 17). Here is a summary of the Table 4 requirement in the draft ADPES draft geotechnical general permit:

- *Monthly TRC measurements as well as minimum and maximum TRC concentrations.*

Footnotes to the TRC parameters:

Footnote 1: TRC is a surrogate parameter for fecal coliform and Enterococci bacteria. Maintain as close to the minimum limit concentration of 1.0 mg/L as possible and measure immediately after chlorination.

Footnote 2: The maximum daily limit of 1.0 mg/L is measured after the last treatment unit and prior to discharge. Maintain as close to the minimum limit concentration of 1.0 mg/L as possible and measure immediately after chlorination.

Shell's recommendations above - compliance under the existing VGP or surrogate parameter TRC - afford EPA the opportunity to confirm compliance for proper treatment of domestic wastewater on geotechnical survey vessels. Compliance monitoring for fecal coliform in EPA's current draft of the GGP (AKG-28-4300) forces unintended consequences due to increased environmental impact from shipping samples from vessels via helicopters multiple times during a season. The short holding time ahead of a fecal coliform analysis further constrains helicopter assets when attempting to meet the holding time "requirement", putting strain on risk decisions around use of assets when dynamic meteorological conditions might exist. Compliance with the sampling and analysis of Discharge 003 would require the use of a helicopter on a weekly basis (if not more frequently if sample hold times cannot be met), contracting only vessels that have helidecks installed, adding to health and safety exposures, and the increased potential for impacts to subsistence activities, depending on the local activities at the time – all without a measurable increased benefit offsetting these issues. The compliance verification methods mentioned afford EPA the capability to verify compliance without increasing potential risk to health and safety exposure, and eliminate the requirement for larger vessels and crew due to the need for a helideck, thereby lessening the chances for impacts to subsistence from additional helicopter flights for sample handling during subsistence activities.

Seyfried, Erin

From: Greg.Horner@shell.com
Sent: Monday, May 19, 2014 5:08 PM
To: Shaw, Hanh
Cc: Seyfried, Erin; Heather.Ptak@shell.com
Subject: RE: EPA's questions for March 26 meeting
Attachments: 2014-05-19 Shell EMP Response Question 2.pdf

Hanh,

Please find attached a document prepared by Shell in response to Question #2 (Environmental Monitoring Plan [EMP] Requirements) from the list of question provided to Shell by EPA back in March. The focus of the attached document is to present the issues Shell has with phases I and II of the EMP within the draft GGP.

I look forward to discussing with EPA any questions or comments on the attached, or any of the documents previously sent by Shell.

Sincerely,

Greg Horner
Shell
Offshore Regulatory Team Lead

From: Shaw, Hanh [mailto:Shaw.Hanh@epa.gov]
Sent: Thursday, March 20, 2014 7:20 AM
To: Horner, Greg J SEPCO-UAA/A/SR; Ptak, Heather A SEP CO-UAA/H/E; Davis, Lana SEPCO-UAA/H/E
Cc: jiani@perkinscoie.com; Owens, Kim; Seyfried, Erin; Opalski, Dan; Childs, Susan A SEPCO-UAA/A/S; Soder lund, Dianne
Subject: EPA's questions for March 26 meeting

In preparation for the March 26 meeting, EPA has prepared the attached list of questions regarding the draft Geotechnical NPDES General Permit for discussion. We look forward to seeing you next week.

____

Hanh Shaw, Manager
Oil, Gas and Energy Sector
U.S. EPA, Region 10
206-553-0171

EPA Question #2: Environmental Monitoring Program

Shell Exploration & Production Company – Alaska Venture (Shell) developed the following response to address EPA's Question #2 on Shell's view of the Environmental Monitoring Program (EMP) requirements in the draft NPDES general permit for oil and gas geotechnical surveys (GGP) in the Alaska Arctic Beaufort and Chukchi Seas (AKG-28-4300). Herein, Shell describes possible changes and clarifications to the EMP requirement as described in the draft GGP, including alternative methods that may be used for producing the relevant information. The response is specific to the EMP requirements as indicated in Section II. A. 14 of the draft GGP.

EMP Phase I

Initial Site Physical Sea Bottom, Water-Column, and Air Characterization - This is intended to identify any potential sensitive biological areas, habitats, or historical properties, as well as understand the general topography of the seafloor to compare with any EMP Phase II observations. It is also intended to collect data on wind speed and direction at the site, as well as water column currents, temperature, salinity, turbidity, and depth.

Shell asserts this information can already be produced/compiled through a combination of:

1) Geophysical surveys that industry will already be performing.

As discussed in Shell's response to EPA Question #7, in which we represented the current anticipated process for pre-site characterization of proposed borehole locations, offshore geotechnical operators review existing geophysical data and clear proposed geotechnical borehole sites prior to mobilization.

2) Scientific information available from past or ongoing studies that have been and/or are being performed in the Chukchi and Beaufort Seas.

Several environmental science studies have recently occurred or are currently occurring in the nearshore and coastal Chukchi Sea including, but not limited to: (i) The Arctic Ecosystem Integrated Survey (Eis), a project funded with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, U.S. Fish and Wildlife Service, and U.S. Department of the Interior; this study is in progress. (ii) the Alaska Monitoring and Assessment Program (AKMAP) project whose goal is to assess the benthic and water quality and ecological status of waters of the northeastern Chukchi Sea from Pt. Hope to Barrow in waters 10-50 meters in depth. Findings are anticipated to be available by late 2014; (iii) the Arctic Coastal Ecosystem Study (ACES) conducted by the North Slope Borough, and (iv) various industry-funded work both offshore (the Chukchi Sea Environmental Studies Program) as well as Shell-specific (the Shell Onshore Survey Program). Results from these programs, and others, are currently being compiled and synthesized by PacMARS (the Pacific Marine Arctic Regional Synthesis) and a complementary and longer-term initiative called SOAR (the Synthesis of Arctic Research).

3) Other publically available meteorological -oceanographic data (e.g., from the National Oceanic and Atmospheric Administration and the Bureau of Ocean Energy Management).

For example, Professor Tom Weingartner, University of Alaska Fairbanks, is currently leading an effort to characterize the Circulation on the Continental Shelf Areas of the Northeast Chukchi and Western Beaufort Seas, (BOEM Cooperative Agreement #M12AC000008). Field data, including sea surface temperature, current direction, and turbidity are being collected from drifter buoys, moored meteorological buoys, a network of shore-based high-frequency radars, high resolution shipboard surveys, instrumented autonomous gliders, and other mooring operations.

Shell believes this base of knowledge and information can be utilized by the permitee in preparing a notice of intent (NOI) and that the EPA will be able to determine that it is sufficient for meeting the goals and objectives of the EMP Phase I such that there will be no need to "re-collect" the data prior to conducting a geotechnical borehole. EPA may also conclude that once the findings of these prior studies are submitted by a permittee with an initial NOI, that the requirement is met for all future NOIs within the same general area(s). In either case, it is requested that EPA revise the draft GGP for geotechnical surveys requirement to state that these processes and data can be supplied to the agency as part of the NOI to satisfy this requirement.

EMP Phase II. Discharge 009 Plume Observations

This monitoring is intended to collect information on potential marine mammal deflections. Initially, it appears there was some confusion about whether any in-the-ocean "plume" monitoring was needed, such as monitoring of the temperature plume. During our March 26th meeting, it was clarified that such monitoring is not needed. However, the language in the draft GGP, (page 20 Objective (4) and page 21 (e)); is still not clear and somewhat conflicting, and Shell understands that EPA appeared to recognize some issues in that area.

Marine mammal monitoring during offshore activities in the Beaufort or Chukchi Seas is stipulated by the agencies entrusted to protect marine mammals (e.g., National Marine Fisheries Service [NMFS] and U.S. Fish & Wildlife Service) to holders of marine mammal incidental take authorizations. Further, BOEM will require permittees conducting geotechnical investigations to show proof of authorization for incidental take of marine mammals. Since marine mammal monitoring is required within NMFS and USFWS authorizations and this monitoring will be continuous regardless of the operations being conducted during the performance of geotechnical investigations Shell respectfully asks the EPA rely on proof that NMFS and USFWS have issued their respective authorizations by requiring the applicant to provide copies of the authorizations prior to final authorization of NOIs to discharge. EPA does not need to specify monitoring for marine mammals during any discharges, since it is already stipulated to be underway regardless.

EMP Phase II. Physical Sea Bottom Characterization

This monitoring is intended to provide both a physical and visual characterization of the sea bottom following cessation of the geotechnical activities, including mapping the extent and depth/thickness of solids deposition from Discharge 001. Although monitoring is only required if drilling fluids are used, this requirement is very difficult to comply with because, as discussed in our responses to Geotechnical Related Activities (EPA Questions #4 and 5) and Pre-Testing/Pre-Certification of Drilling Fluid/Mud Formulation (EPA Questions #1, 3 and 5), the use of drilling fluid additives, while not expected for most of the geotechnical boreholes, will not be known with certainty in advance of drilling activities. Given this, and in order to comply with this requirement, geotechnical operators must then plan to conduct post-activity monitoring at each borehole regardless - even in the event "*de minimus*" amounts of drilling fluid are used.

The Ocean Discharge Criteria Evaluation (ODCE) concludes that the seafloor deposition of materials from Discharge 001 is so small (several millimeters at most), that it is not sufficient to cause harm to the benthos or other biology, does not elevate the contaminant concentrations in the sediments, and does not generate a source of bioavailable contaminants. The information provided by John Trefry during the March 26th meeting with EPA further demonstrated that the drilling muds will not alter the surface sediment metals concentrations, even at the locations with the most deposition, because what is added has no higher metals concentrations than the native sediments. There should therefore not be a need to attempt to visually document the deposition. If this is to remain an EMP requirement, then EPA should better describe why it is important, and how the data are to be used, considering their conclusion in the ODCE that the these discharges will not cause any harm to the seafloor.

Furthermore, visual (e.g., with cameras on an Sediment Profile Imaging instrument or Remotely Operated Vehicle) observation are not likely to be sensitive enough to reliably document the very little deposition, and subtle changes in the deposition, with visual techniques.

Predictive numerical modeling is available should such documentation be needed, and can be used as a more reliable approach to assess the dispersion and distribution of the discharges. We respectfully recommend to the EPA that they modify language to the EMP requirements that in lieu of using data collected under the exploration permit or collecting new data, the permittee can summarize existing regional data and the results of predictive numerical modeling submitted as part of the NOI. See Attachment A for recommended changes.

Attachment A.

Shell recommends changes to the content of the draft GGP, Section II.A.14, the requirements of the Environmental Monitoring Program (EMP). These changes are shown via "red-line" strike -out and insertion of "red-line" language throughout the following text excerpted from the draft GGP.

Recommended Changes to Section II.A.14 of draft GGP No. AKG-28-4300

Environmental Monitoring Program. The permittee must design and implement an environmental monitoring program (EMP) for geotechnical surveys and/or related activities. The permittee must design and implement the EMP that includes, if applicable, the following phases:

- Phase I – Baseline Site Characterization; may be required at each geotechnical ~~activity site~~area of operations, if not already conducted or met by the inclusion of previously collected baseline environmental data provided by the permittee at the time of filing a NOI to discharge under this general permit.
- Phase II – Post-Geotechnical Activity; required ~~if water -based drilling fluids will be used to conduct the geotechnical activity, or~~ if the Director requests completion of Phase II upon review of site -specific data. Unless otherwise specified by the Director, a Phase II analysis is not required if: (1) the geotechnical activities are located within the lease blocks whereby an EMP has been previously conducted pursuant to the 2012 Beaufort & Chukchi Exploration NPDES General Permits (AKG -28-2100 and AKG -28-8100); (2) the permittee has established to the satisfaction of the Director sufficient existing baseline site characterization data and depositional modeling information; or (~~2~~3) the permittee is not using water-based drilling fluids.

The EMP shall meet the following goals, objectives and other requirements.

a. Goals

1. evaluate potential impacts of water -based drilling fluids and drill cuttings associated with geotechnical surveys and/or related activities on the marine environment; and

2. protect the marine environment; and

3. collect data during this permit term for use in future permit developments.

b. Objectives

1. complete baseline site characterization, including physical sea bottom survey, to ensure the authorized discharges do not occur on or near a sensitive biological area or habitat;

2. ensure that the geotechnical survey locations do not occur in the vicinity of potential historic properties;

3. evaluate areal effects of solids deposition associated with Discharge 001 at the seafloor.~~; and~~

~~4. evaluate the plume(s) in the vicinity of Discharge 009~~.

c. Plan of Study. The applicant must submit an EMP Plan of Study to the Director for review with the first-time NOI ~~and the annual NOI renewal~~. The Plan of Study must include the permittee's EMP scope of work. The applicant must incorporate any changes to the EMP Plan of Study required by the Director, which will be included in the discharge authorization letter. The EMP must address the EMP goals, objectives and main components. A Plan of Study must include the following:

1. the EMP goals, objectives and phases discussed in Sections II.A.14.a.-c.;

2. each element of the EMP, pursuant to Sections II.A.14.e.-f.;

3. all monitoring procedures and methods;

4. a quality assurance project plan (see Section IV.A.);

5. a detailed discussion of how data will be used to meet, test, and evaluate the EMP objectives; and

6. a summary of results from previous environmental monitoring studies at the geotechnical activity site that are relevant to the EMP goals and objectives.

d. Phase I Assessment.

1. Initial Site Physical Sea Bottom Survey. If not already conducted, or met by the inclusion of existing environmental baseline data provided by the permittee at the time of NOI submittal or a prior NOI submittal in the same general area of past operations, ~~C~~conduct an assessment of the physical sea bottom before initiating discharges authorized by the general permit to ensure the geotechnical activity site is not located in or near a sensitive biological area, habitat, or historic properties. The survey should provide both a physical and visual characterization of the seafloor. If the proposed initial site is located in or near a sensitive biological area, habitat, or in the vicinity of historic properties, the permittee must report the information to the Director in accordance with Section II.A.14.g.1.

2. Physical Characteristics. If not already provided at the time of NOI submittal sufficient to characterize representative site conditions, or a prior NOI submittal in the same general area of past operations, ~~C~~collect physical data to characterize the conditions of the geotechnical activity site and receiving waters. These physical data include surface wind speed and direction, current speed and direction throughout the water column, water temperature, salinity, depth, and turbidity.

e. Phase II Assessment.

~~1. Discharge 009 (non-contact cooling water) Plume Observations. The permittee must collect observations for potential marine mammal deflection during periods of discharge~~.

1. ~~2.~~ Physical Sea Bottom Survey. If the Director decides that predictive numerical modeling results are not sufficient to discern what post-activity conditions from Discharge 001 would be, then ~~C~~conduct a physical sea bottom survey ~~immediately~~ within one year following cessation of geotechnical activities ~~at the site~~in the area of operations. The physical sea bottom survey should provide both a physical and visual characterization of the seafloor to ~~assess~~ determine

representative post-activity conditions in the geotechnical ~~activity site condition~~area of operations. The survey ~~must~~ should attempt to map the areal extent and depth/thickness of solids deposition caused by Discharge 001 ~~and depict any potential overlap from deposition caused by nea rby exploration activities~~.

f. EMP Reports. The permittee must submit an annual EMP report to the Director.

1. The permittee must notify the Director, in writing, 7 calendar days from receipt of the physical sea bottom survey data, if the data indicates th e proposed geotechnical activity is located in or near a sensitive biological area, habitat, or in the vicinity of historic properties. The notification described in this paragraph must be signed in accordance with the Signatory Requirements (Section VI.E.) of this general permit.

2. The permittee must submit the EMP report ~~with the annual NOI renewal or~~ within 1 year of completing geotechnical surveys, or Physical Sea Bottom Survey under (e) ~~2~~1 above if conducted after the completion of geotechnical surveys, and/or related activities~~, whichever comes first~~. The EMP report must contain the following information:

i. summary of the results for each phase of environmental monitoring;

ii. discussion of how the EMP goals and objectives were accomplished;

iii. analytical test methods used for data analysis;

iv. description of any observed impacts of the effluent on the physical characteristics of the receiving water environment;

v. description of the data, evaluations and determinations with regard to each EMP phase; and

vi. all relevant quality assurance/quality control information including, but not limited to, laboratory instrumentation, laboratory procedures, analytical method detection limits, analytical method precision requirements, and sample collection methodology.

3. If the Director requires revisions to the EMP report, the permittee must complete the revisions and submit a revised report to the Director within 60 days of the date of the request or within the time period identified by the Director, whichever time period is longer.

g. Implementation and Modification. The EMP may be modified if the Director determines that the modification is appropriate. Modifications to the EMP may include changes in sampling location, changes in sample frequency, or changes to parameters to be monitored. This determination will be made by the Director upon receipt of the first -time NOI ~~and/or annual NOI renewal package~~ and upon review of the findings reported in t he EMP report prepared after completion of authorized geotechnical activit y discharges.